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L7: Entry 14 of 14 File: DWPI Apr 9, 1996

DERWENT-ACC-NO: 1995-217279
DERWENT-WEEK: 199620

TITLE: Plasma etching silica selectively w.r.t. silicon nitride and poly:silicon@ - using ammonia- nitrogen tri:fluoride mixt. as plasma gas and converting oxide to ammonium hexa:fluorosilicate

INVENTOR: BARNES, M S; CHAPPLE-SOKOL, J D ; COTLER, T J ; HOLBER, W M ; KELLER, J H ; PODLESNIK, D

PRIORITY-DATA: 1993US-0168887 (December 16, 1993)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 5505816 A	April 9, 1996		011	H01L021/00
EP 658928 A1	June 21, 1995	E	012	H01L021/311

INT-CL (IPC): H01 L 21/00; H01 L 21/311

ABSTRACTED-PUB-NO: EP 658928A
BASIC-ABSTRACT:

A method of selectively etching an oxide layer comprises generating a plasma of reactive radicals in a chamber (16) contg. a substrate (18) having an oxide layer and exposing for sufficient time to permit a desired portion of the oxide to form prod. layers contg. ammonium hexafluorosilicate.

Also claimed is a non-selective method of etching oxides as above which consumes the oxides to prod. layers at equal rates.

Also claimed is a method as above in which the plasma gas mixt. (14) comprises NH3/NF3 or CF4/)2 mixed in H2 and N2. and the oxide layer is initially formed on the substrate independently of the etching step.

USE - For selectively etching oxide films on Si wafers, both natural and other oxide films, and in etching vias and trenches.

ADVANTAGE - Wet HF processing is avoided, there is no polymer formation, and different types of oxide are etched non-selectively.

ABSTRACTED-PUB-NO:

US 5505816A EQUIVALENT-ABSTRACTS:

Producing a silicon dioxide free surface comprises placing a substrate with a silicon dioxide layer in a chamber, the substrate including an etch stop layer which is selected from the group consisting of silicon nitride and polysilicon; generating a plasma of reactive radicals from a gas mixture, the generating occurring in the chamber; and exposing the silicon dioxide layer on the substrate to the plasma for a sufficient length of time where a portion of the silicon dioxide layer forms product layers containing ammonium hexafluorosilicate whereby the step of generating the plasma in the chamber produces enhanced etching anisotropy during the step of exposing in comparison to exposing the substrate to a plasma generated remotely from the chamber, and where the silicon nitride and polysilicon layers are affected than the oxide layer.

WEST Search History

DATE: Friday, November 01, 2002

Set Name side by side	Query	Hit Count	Set Name result set
	DB=DWPI; PLUR YES; OP OR		
L7	L6 not l4	14	L7
L6	L5 and l2 and l3	18	L6
L5	sun-z$ or podlesnik-d$ or qian-x$	465	L5
L4	L3 and l2 and l1	5	L4
L3	etch$ or patern$ or pattern$ or remov$	1243038	L3
L2	plasma$ or sputter$ or corona or rie or mrie or merie or glow near3 discharg$ or reactive near3 ion	133242	L2
L1	xu-s$	516	L1

END OF SEARCH HISTORY

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L7: Entry 8 of 14 File: DWPI Jan 30, 2001

DERWENT-ACC-NO: 2001-122557
DERWENT-WEEK: 200139

TITLE: Plasma etching of trench having a rounded top corner involves etching through the hard masking layer and underlying layers, and etching a trench portion in the silicon substrate

INVENTOR: JAIN, A; LIU, W ; LOW, M S M ; MUI, D ; PODLESNIK, D ; ZOU, G

PRIORITY-DATA: 2000US-0545700 (April 7, 2000), 1999US-0371966 (August 10, 1999)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6180533 B1	January 30, 2001		022	H01L021/00

INT-CL (IPC): H01 L 21/00

ABSTRACTED-PUB-NO: US 6180533B
BASIC-ABSTRACT:

NOVELTY - Plasma etching of trench having a rounded top corners in silicon substrate involves etching through hard masking layer and additional underlying layers overlying the silicon substrate using feed gas(es) which does not provide polymer deposition on the semiconductor structure, and etching at least a first trench portion into the silicon substrate using reactive species.

DETAILED DESCRIPTION - Plasma etching of trench having a rounded shape (412) top corner in a silicon substrate (402) comprises:

(i) providing a semiconductor structure (400) comprising a hard masking layer overlying the silicon substrate,

(ii) plasma etching through the hard masking layer and any additional underlying layers overlying the silicon substrate using plasma feed gas(es) which does not provide polymer deposition on semiconductor structure surfaces during etching, where the etching exposes a surface of the silicon substrate,

(iii) plasma etching at least a first portion of a trench into the silicon substrate using reactive species generated from a feed gas comprising sources of fluorine, carbon, hydrogen, and high energy species which provide physical bombardment of the silicon

substrate.

USE - For etching a trench having rounded top corners in silicon substrate.

ADVANTAGE - The method provides excellent critical dimension control over the active area of a transistor produced. It reduces the need to remove polymer from substrate and reactor surfaces after etching of the silicon trench.

DESCRIPTION OF DRAWING(S) - The figure shows the structure after etching of a shallow trench into the silicon substrate.

Semiconductor structure 400

Silicon substrate 402

Silicon oxide 404

Silicon nitride 406

Rounded shape 412

WEST

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L7: Entry 1 of 14 File: DWPI May 7, 2002

DERWENT-ACC-NO: 2002-498484
DERWENT-WEEK: 200253

TITLE: Plasma etching of organic coating layer, used to produce semiconductor devices, involves exposing organic layer to plasma of gas containing carbon and fluorine-containing compound, oxygen and bromine-containing compound

INVENTOR: CHINN, J D; NISHIKIDO, K ; PODLESNIK, D ; SHEN, M

PRIORITY-DATA: 2000US-0611085 (July 6, 2000)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6383941 B1	May 7, 2002		015	H01L021/00

INT-CL (IPC): H01 L 21/00

Brcpd – O2 – Fcpd

ABSTRACTED-PUB-NO: US 6383941B
BASIC-ABSTRACT:

NOVELTY - A substrate having organic coating layer is exposed to plasma generated from source gas consisting of carbon and fluorine compound(s), oxygen, and bromine-containing compound(s). The volumetric flow ratio of fluorine-containing compound to bromine-containing compound is 2:1-5:1, and volumetric flow ratio of fluorine-containing compound and the bromine-containing compound combined to the oxygen is 1:1-4.5-1.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for semiconductor structure having at least one layer of polysilicon with at least one overlaying layer of antireflecting coating. The structure has etched features having critical dimension of 0.2 microns or less and critical dimension uniformity over the surface of 50 nm or less.

USE - Plasma etching organic coating layer such as organic antireflective coating used to produce semiconductor devices.

ADVANTAGE - The process provides control over etched features critical dimension, etch profile and uniformity of etch across substrate despite difference in the spacing of etched features over the substrate surface.

DESCRIPTION OF DRAWING(S) - The figure shows the graph of shift in

critical dimension of etched features as a function of spacing between etched features for the top, bottom and center spaces of wafer.

WEST

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L7: Entry 9 of 14 File: DWPI Apr 30, 2002

DERWENT-ACC-NO: 2000-117020
DERWENT-WEEK: 200235

TITLE: Etching of silicon substrates particularly for etching deep trench for capacitor technology in DRAM applications

INVENTOR: KHAN, A; LI, M ; LIU, W ; PAN, S ; PODLESNIK, D ; WANG, Y

PRIORITY-DATA: 1998US-0102527 (June 22, 1998), 2000US-0716074 (November 16, 2000)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6380095 B1	April 30, 2002		000	H01L021/302
WO 9967817 A1	December 29, 1999	E	037	H01L021/3065

INT-CL (IPC): H01 L 21/302; H01 L 21/3065

ABSTRACTED-PUB-NO: US 6380095B
BASIC-ABSTRACT:

NOVELTY - Plasma etching at least a portion of a silicon substrate (502) includes selecting a plasma source gas comprising at least three reactive gases and etching at least a portion of the silicon surface. The reactive gases includes at least one fluorine-containing compound which does not contain silicon, at least one silicon-containing compound and oxygen (O2).

DETAILED DESCRIPTION - The method for plasma etching at least a portion of a silicon substrate includes: (a) selecting a plasma source gas comprising at least three reactive gases and (b) etching at least a portion of the silicon surface.

The reactive gases include: (i) at least one fluorine-containing compound which does not contain silicon; (ii) at least one silicon-containing compound; and (iii) oxygen. The volumetric ratio of the fluorine-containing compound to the silicon-containing compound is 100:1-1:10.

An INDEPENDENT CLAIM is also included for a plasma etched trench structure comprising an open area of less than 5 %. At least a portion of the etched trench surface comprises silicon. The critical dimension of the trench is 0.2 mu m or less and the aspect ratio is 20:1 or greater.

USE - The method is used for etching of silicon substrates, particularly for etching deep trench for capacitor technology in DRAM applications.

ADVANTAGE - The invention makes it possible to protect pattern masking layers from lateral erosion and upper surface etching while simultaneously provides an excellent etch rate for the silicon trench.

DESCRIPTION OF DRAWING(S) - The drawing shows a cross-sectional profile of a deep etched silicon trench structure obtained in a single etch step using the method of the invention.

Silicon substrate 502

Silicon trench 503

Pad oxide dielectric layer 504

Silicon surface 505

Silicon nitride masking layer 506

Borosilicate glass layer 508
ABSTRACTED-PUB-NO:

WO 9967817A EQUIVALENT-ABSTRACTS:

NOVELTY - Plasma etching at least a portion of a silicon substrate (502) includes selecting a plasma source gas comprising at least three reactive gases and etching at least a portion of the silicon surface. The reactive gases includes at least one fluorine-containing compound which does not contain silicon, at least one silicon-containing compound and oxygen (O2).

DETAILED DESCRIPTION - The method for plasma etching at least a portion of a silicon substrate includes: (a) selecting a plasma source gas comprising at least three reactive gases and (b) etching at least a portion of the silicon surface.

The reactive gases include: (i) at least one fluorine-containing compound which does not contain silicon; (ii) at least one silicon-containing compound; and (iii) oxygen. The volumetric ratio of the fluorine-containing compound to the silicon-containing compound is 100:1-1:10.

An INDEPENDENT CLAIM is also included for a plasma etched trench structure comprising an open area of less than 5 %. At least a portion of the etched trench surface comprises silicon. The critical dimension of the trench is 0.2 mu m or less and the aspect ratio is 20:1 or greater.

USE - The method is used for etching of silicon substrates, particularly for etching deep trench for capacitor technology in DRAM applications.

ADVANTAGE - The invention makes it possible to protect pattern

masking layers from lateral erosion and upper surface etching while simultaneously provides an excellent etch rate for the silicon trench.

DESCRIPTION OF DRAWING(S) - The drawing shows a cross-sectional profile of a deep etched silicon trench structure obtained in a single etch step using the method of the invention.

Silicon substrate 502

Silicon trench 503

Pad oxide dielectric layer 504

Silicon surface 505

Silicon nitride masking layer 506

Borosilicate glass layer 508

WEST

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L7: Entry 2 of 14 File: DWPI Oct 16, 2001

DERWENT-ACC-NO: 2002-235891
DERWENT-WEEK: 200229

NF_3

TITLE: Trench profile controlling method for dynamic random access memory, involves changing amount of nitrogen fluoride in etchant gas to control profile of trench etched in substrate

INVENTOR: CHINN, J D; KHAN, A ; KUMAR, A ; PODLESNIK, D V

PRIORITY-DATA: 1999US-0326334 (June 7, 1999)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6303513 B1	October 16, 2001		013	H01L021/00

INT-CL (IPC): H01 L 21/00

ABSTRACTED-PUB-NO: US 6303513B
BASIC-ABSTRACT:

NOVELTY - Energy is provided to etchant gas containing nitrogen fluoride (NF3) to form a plasma proximate to a silicon substrate. The substrate is etched with the plasma to form a trench. The amount of (NF3) in the etchant gas is changed to control profile of the trench.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(a) Method for etching trench in a silicon substrate;

(b) Recording medium containing program for controlling semiconductor wafer processing system;

(c) Apparatus for processing semiconductor wafer

USE - For controlling profile of trenches etched in manufacture of integrated circuits for forming trench capacitors in dynamic random access memory (DRAM) or isolation trenches between transistors and for logic devices.

ADVANTAGE - Controls the profile of trenches during silicon etch while minimizing contamination to a chamber.

DESCRIPTION OF DRAWING(S) - The figure shows the flowchart of

computer program for controlling a profile of trench etched in a silicon substrate.

WEST

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L4: Entry 3 of 5 File: DWPI Sep 8, 2000

DERWENT-ACC-NO: 2000-565532
DERWENT-WEEK: 200142

TITLE: Etching titanium silicide useful as a gate material in memory devices, e.g. dynamic random access memory, involves exposing to a plasma etchant comprising fluorine-containing gas, and hydrogen bromide and/or chlorine gas

INVENTOR: KUSUKI, T; QIAN, X ; XU, S

PRIORITY-DATA: 1999US-0264381 (March 5, 1999)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
WO 200052749 A1	September 8, 2000	E	028	H01L021/3213

INT-CL (IPC): H01 L 21/3213

ABSTRACTED-PUB-NO: WO 200052749A
BASIC-ABSTRACT:

NOVELTY - Titanium silicide (210) is etched by exposing its surface to a plasma etchant comprising a fluorine-containing gas, and hydrogen bromide and/or chlorine gas.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for an apparatus for etching titanium silicide (TiSix) comprising:

(i) a memory that stores instruction for exposing the TiSix substrate to plasma etchant,

(ii) a processor to execute instructions stored by the memory,

(iii) a plasma etch chamber to expose the substrate to the plasma etchant, and

(iv) a port to handle communications between the processor and the plasma etch chamber.

USE - For etching titanium silicide useful as a gate material in memory devices, e.g. dynamic random access memory (DRAM) and static random access memory (SRAM).

ADVANTAGE - The invention effectively etch the silicon nodules which prevents formation of undesirable residue.

DESCRIPTION OF DRAWING(S) - The figure shows a schematic cross-sectional view of a trench obtainable by the etching process.

Titanium silicide layer 210

Silicon nodules 240

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End of Result Set

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L4: Entry 5 of 5 File: DWPI Dec 28, 1999

DERWENT-ACC-NO: 1998-044580
DERWENT-WEEK: 200007

TITLE: Selectively and anisotropically etching polycide structures - using chlorine@, oxygen@ and helium plasma and combined inductive and capacitive plasma sources

INVENTOR: PAN, S; XU, S

PRIORITY-DATA: 1996US-0665657 (June 17, 1996)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6008139 A	December 28, 1999		000	H01L021/302
EP 814500 A2	December 29, 1997	E	019	H01L021/321
JP 10116823 A	May 6, 1998		045	H01L021/3065
KR 98005800 A	March 30, 1998		000	H01L021/3065
TW 345682 A	November 21, 1998		000	H01L021/02

INT-CL (IPC): C23 F 4/00; H01 J 37/32; H01 L 21/02; H01 L 21/302; H01 L 21/3065; H01 L 21/321; H01 L 21/3213

ABSTRACTED-PUB-NO: EP 814500A
BASIC-ABSTRACT:

A method of selectively etching metal silicide or polysilicon layers on a silicon wafer or other substrate comprises placing the substrate (20) in a process chamber (50) having electrodes (60,65) and an inductor coil (75), introducing chlorine, oxygen and helium (70) and forming a plasma (55). Plasma ions energetically impinge to etch the layers and are formed by applying RF current at 400-3000 W to the coil and RF voltage at a bias power level to the electrodes. The power ratio Pr of the source to the bias power level is at least 2:1.

USE - In etching polycide structures on semiconductor substrates to form high-density conductive interconnect features and lines

ADVANTAGE - The etch is highly selective for metal silicide over polysilicon, is anisotropic, provides uniform etch rates across the substrate and does not use HBr.
ABSTRACTED-PUB-NO:

US 6008139A EQUIVALENT-ABSTRACTS:

A method of selectively etching metal silicide or polysilicon layers on a silicon wafer or other substrate comprises placing the substrate (20) in a process chamber (50) having electrodes (60,65) and an inductor coil (75), introducing chlorine, oxygen and helium (70) and forming a plasma (55). Plasma ions energetically impinge to etch the layers and are formed by applying RF current at 400-3000 W to the coil and RF voltage at a bias power level to the electrodes. The power ratio Pr of the source to the bias power level is at least 2:1.

USE - In etching polycide structures on semiconductor substrates to form high-density conductive interconnect features and lines

ADVANTAGE - The etch is highly selective for metal silicide over polysilicon, is anisotropic, provides uniform etch rates across the substrate and does not use HBr.

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L7: Entry 4 of 14 File: DWPI Dec 20, 2001

DERWENT-ACC-NO: 2001-581304
DERWENT-WEEK: 200239

TITLE: Plasma etching of silicon substrate and films with mask patterns, involves forming plasma from gaseous mixture of oxygen, and fluorocarbon for etching substrate

INVENTOR: CHINN, J D; KHAN, A ; KUMAR, A ; PODLESNIK, D V

PRIORITY-DATA: 1999US-0471555 (December 23, 1999)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
KR 2001112277 A	December 20, 2001		000	H01L021/3065
WO 200148795 A2	July 5, 2001	E	028	H01L021/00
EP 1194952 A2	April 10, 2002	E	000	H01L021/3065

INT-CL (IPC): H01 L 21/00; H01 L 21/3065; H01 L 21/311

ABSTRACTED-PUB-NO: WO 200148795A
BASIC-ABSTRACT:

NOVELTY - A substrate with high percentage open area having microelectrical mechanical system pattern is exposed to plasma formed from a gaseous mixture which includes oxygen, fluorine and fluorocarbon. A portion of the substrate is etched with the plasma.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for apparatus for etching silicon in plasma etching chamber.

USE - Used for plasma etching on silicon substrate and films with mask patterns e.g. microelectrical mechanical system (MEMS) pattern of large open areas, for designing device such as dynamic random access memory.

ADVANTAGE - The isotropic etch component provided by additional fluorine removes silicon spikes on substrate and the hence useful area of substrate increases. As the plasma etching gives smooth side wall profiles it is suited for applications requiring high precision MEMS fabrication and electronic device fabrication.

DESCRIPTION OF DRAWING(S) - The figure shows the high percentage open area pattern.

WEST

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L7: Entry 5 of 14 File: DWPI May 22, 2001

DERWENT-ACC-NO: 2001-373683
DERWENT-WEEK: 200139

TITLE: Plasma etching method for trench formation, involves using different types of feed gas to etch the silicon substrate through photoresist layer and silicon dioxide layer to form trench

INVENTOR: CHINN, J; KIM, N ; LEE, G ; LIU, W ; MUI, D ; PODLESNIK, D

PRIORITY-DATA: 1999US-0371966 (August 10, 1999)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6235643 B1	May 22, 2001		021	H01L021/00

INT-CL (IPC): H01 L 21/00

ABSTRACTED-PUB-NO: US 6235643B
BASIC-ABSTRACT:

NOVELTY - A trench (416) is formed by plasma etching on etching a portion of organic photoresist layer (408), through SiO2 layer (404) and the upper portion of substrate (402) using different types of feed gas.

DETAILED DESCRIPTION - The feed gas comprises carbon and fluorine comprising compound selected from group consisting of CF4, CHF3, CH2F2, CH3F and its combination. Another feed gas comprises oxygen. INDEPENDENT CLAIMS are also included for the following:

(a) Plasma etching apparatus;

(b) Recording medium

USE - For forming trench in silicon substrate.

ADVANTAGE - Silicon oxide etch and silicon trench etch are performed in single processing chamber. Leads to reduction in processing time, increased throughput and decreased processing costs.

DESCRIPTION OF DRAWING(S) - The figure shows the Si structure after etching shallow trench.

Substrate 402

SiO2 layer 404

Organic photoresist layer 408

Trench 416

WEST

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L7: Entry 6 of 14 File: DWPI Sep 6, 2001

DERWENT-ACC-NO: 2001-319174
DERWENT-WEEK: 200154

TITLE: Plasma etching of silicon nitride layer for e.g. printhead cartridges, involves forming plasma from gaseous mixture comprising etchant gas in sputtering gas and etching nitride layer at high etch rate

INVENTOR: CHINN, J; KHAN, A ; KUMAR, A ; PODLESNIK, D ; CHINN, J D ; PODLESNIK, D V

PRIORITY-DATA: 1999US-0430798 (October 29, 1999), 2001US-0853847 (May 11, 2001)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 2001019897 A1	September 6, 2001		000	H01L021/302
EP 1096547 A2	May 2, 2001	E	028	H01L021/00
US 6270634 B1	August 7, 2001		000	C23C014/34

INT-CL (IPC): C23 C 14/34; C23 F 1/02; C23 F 3/00; H01 L 21/00; H01 L 21/302; H01 L 21/461

ABSTRACTED-PUB-NO: EP 1096547A
BASIC-ABSTRACT:

NOVELTY - Plasma etching a silicon nitride layer comprises forming a plasma from a gaseous mixture consisting of an etchant gas in a sputtering gas; and etching a silicon nitride layer at more than 2 mu m/minute.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(A) a computer-readable storage medium embodying program code for controlling a processing system to etch a layer of material formed on a workpiece in accordance with: (a) flowing a gaseous composition consisting of an etchant gas and a sputtering gas from the gas supply into a chamber; (b) providing energy from each power supply to the chamber to form a plasma from the composition; and (c) etching all of the layer of material for at least 2 mu m/minute; and

(B) a plasma etching apparatus comprising a gas panel (222) coupled to a processing chamber (200); an antenna proximate to the chamber;

a first power supply coupled to the antenna; a second power supply coupled to the chamber; and a controller (500) coupled to the power supplies and the gas panel and comprising the computer-readable storage medium.

USE - For plasma etching silicon nitride layers more than 5 microns m thick for e.g., printhead cartridges, inkjet printers, surgical instruments, or bio-medical devices.

ADVANTAGE - Permits plasma etching of difficult to etch materials at a higher, commercially viable silicon nitride etch rate.

DESCRIPTION OF DRAWING(S) - The figure shows a computer-controlled high density plasma etching apparatus.

Processing chamber 200

Gas panel 222

Controller 500
ABSTRACTED-PUB-NO:

US 6270634B EQUIVALENT-ABSTRACTS:

NOVELTY - Plasma etching a silicon nitride layer comprises forming a plasma from a gaseous mixture consisting of an etchant gas in a sputtering gas; and etching a silicon nitride layer at more than 2 mu m/minute.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(A) a computer-readable storage medium embodying program code for controlling a processing system to etch a layer of material formed on a workpiece in accordance with: (a) flowing a gaseous composition consisting of an etchant gas and a sputtering gas from the gas supply into a chamber; (b) providing energy from each power supply to the chamber to form a plasma from the composition; and (c) etching all of the layer of material for at least 2 mu m/minute; and

(B) a plasma etching apparatus comprising a gas panel (222) coupled to a processing chamber (200); an antenna proximate to the chamber; a first power supply coupled to the antenna; a second power supply coupled to the chamber; and a controller (500) coupled to the power supplies and the gas panel and comprising the computer-readable storage medium.

USE - For plasma etching silicon nitride layers more than 5 microns m thick for e.g., printhead cartridges, inkjet printers, surgical instruments, or bio-medical devices.

ADVANTAGE - Permits plasma etching of difficult to etch materials at a higher, commercially viable silicon nitride etch rate.

DESCRIPTION OF DRAWING(S) - The figure shows a computer-controlled high density plasma etching apparatus.

Processing chamber 200

Gas panel 222

Controller 500

US2001019897A

NOVELTY - Plasma etching a silicon nitride layer comprises forming a plasma from a gaseous mixture consisting of an etchant gas in a sputtering gas; and etching a silicon nitride layer at more than 2 mu m/minute.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(A) a computer-readable storage medium embodying program code for controlling a processing system to etch a layer of material formed on a workpiece in accordance with: (a) flowing a gaseous composition consisting of an etchant gas and a sputtering gas from the gas supply into a chamber; (b) providing energy from each power supply to the chamber to form a plasma from the composition; and (c) etching all of the layer of material for at least 2 mu m/minute; and

(B) a plasma etching apparatus comprising a gas panel (222) coupled to a processing chamber (200); an antenna proximate to the chamber; a first power supply coupled to the antenna; a second power supply coupled to the chamber; and a controller (500) coupled to the power supplies and the gas panel and comprising the computer-readable storage medium.

USE - For plasma etching silicon nitride layers more than 5 microns m thick for e.g., printhead cartridges, inkjet printers, surgical instruments, or bio-medical devices.

ADVANTAGE - Permits plasma etching of difficult to etch materials at a higher, commercially viable silicon nitride etch rate.

DESCRIPTION OF DRAWING(S) - The figure shows a computer-controlled high density plasma etching apparatus.

Processing chamber 200

Gas panel 222

Controller 500